Allen-Bradley

ALEC

AxisLink Encoder Converter

Cat No. 4100-5.3

Installation and Setup Manual

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or part, without written permission of Rockwell Automation, is prohibited.

Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

Allen-Bradley is a trademark of Rockwell Automation

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

Preface — Read This Manual

Read This Manual 1
Who Should Use this Manual. 1
Purpose of this Manual 1
Safety Precautions 2
Terminology 3
Common Techniques Used in this Manual 4
ALEC Product Receiving and Storage Responsibility 4
Allen-Bradley Support 5
On the Web 5

Chapter 1 — Overview

ALEC Description 7
ALEC Features. 7
ALEC Mechanical Specifications 8

Chapter 2 — Installation & Hook-Up

Chapter Objectives 11
Installing the ALEC 11
Complying with European Union Directives 11
    EMC Directive 12
Mounting the ALEC 12
Connecting the ALEC 13
Wiring the ALEC 14
    Wiring Cable Flying Leads to the Plugs 14
    Connecting AxisLink 15
    Connecting the Encoder 17
        Allen-Bradley 845F, 845H, and 845T Encoders 18
        Allen-Bradley 845K Encoders. 18
        Allen-Bradley 845P Encoders 19
Connecting a Registration Sensor 20
    Using the Registration Input 21
    Power Supply Connector 22
    Fault Relay 24

Chapter 3 Setup

Chapter Objectives 27
Setting the Rotary Switches 27
Selecting the Operation Mode 27
Selecting the AxisLink Address 28
Selecting the Options Configuration 29
Encoder Power (12V 5V) 29
Extended Nodes (Extd Node On/Off) 29
Encoder Fault (Enc. Fault On/Off) 30
Extended/Standard Length (Extd Length On/Off) 30
Extended/Standard Length Termination 1. 30
Extended/Standard Length Termination 2. 30
Extended versus Standard AxisLink. 31
Allen-Bradley 845 Encoders. 31
Powering the ALEC 33
ALEC With GML Commander. 34
Adding ALEC to Commander AxisLink Configuration. . . . 34

Chapter 4 Fault Indication & Control Status

Chapter Objectives 37
AL LED. 37
AxisLink Fault 38
AxisLink Failing 38
No Fault 39
. 39
CPU OK 39
Encoder OK LED 39

Appendix A Specifications

Equivalent Circuit Diagrams. 45

Appendix B Upgrading From ALEC Series C to Series D

Summary of Changes 47
Physical Dimensions 47
Mode Rotary Switch 47
AxisLink Address Rotary Switch 48

DIP Switches 48
Resetting the Encoder Mode 49
Encoder OK LED 49
Fault Relay 50

Index

Index 51

Read This Manual

Read and understand this instruction manual. It provides the necessary information to let you install, connect, and set up the ALEC for safe, reliable operation. This preface covers the following topics:

- Who should use this manual
- The purpose of this manual
- Terminology
- Common techniques used in this manual
- Allen-Bradley support

Who Should Use this Manual

You should read this manual if you are responsible for the installation, set up or operation of the ALEC (AxisLink Encoder Converter).

If you do not have a basic understanding of the products listed below, contact your local Allen-Bradley representative for information on available training courses before using this product.

- S Class Compact motion controller
- 1394 GMC System module
- GML (Graphic Motion Language) Commander software

Purpose of this Manual

This manual is an installation and set up guide for the ALEC and describes the procedures necessary to properly install and configure it into your motion control system.

Safety Precautions

The following general precautions apply to the ALEC:

ATTENTION

Electric shock can kill. Make sure the ALEC is safely installed in accordance with the Installation and Set-up chapters of this manual. Avoid contact with electrical wires and cabling while power is on. Only trained service personnel should open the electrical cabinet.

This product contains stored energy devices. To avoid hazard of electrical shock, verify that all voltage on the capacitors has been discharged before attempting to service, repair, or remove this unit. You should only attempt the procedures in this manual if you are qualified to do so and familiar with solid-state control equipment and the safety procedures in publication NFPA 70E and BS-EN 60204.

The system integrator is responsible for local safety and electrical codes.

ATTENTION

An incorrectly applied or installed product can result in component damage or a reduction in product life. Wiring or application errors, such as undersizing or inadequate DC supply, or excessive ambient temperatures can result in a malfunction.

The ALEC contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage can result if ESD control procedures are not followed. If you are not familiar with static control procedures, refer to Allen-Bradley publication 8000-4.5.2, Guarding Against Electrostatic Damage or any other applicable ESD Protection Handbook.

Contents of this Manual

Chapter	Title	Contents
	Preface	Describes the purpose, background, and scope of this manual. Also specifies the audience for whom this manual is intended.
1	Overview	Provides a general description of the ALEC, its features and mechanical specifications.
2	Installation & Hookup	Provides the steps needed to successfully mount and wire the ALEC to an incremental encoder and the AxisLink cable.
3	Set-Up	Provides the guidelines for setting up and configuring the ALEC.
4	Fault Indication & Control Status	Provides information on fault and status indicators and types of faults.
Appendix A	Specifications	Provides physical, electrical, environmental, and functional specifications for the ALEC.
Appendix B	Upgrading From ALEC Series C to ALEC Series D	Provides a summary of changes from series C to series D. Contains tables for comparing the differences between the two series.

Related Documentation

The following documents contain additional information concerning related Allen-Bradley products. To obtain a copy, contact your local Allen-Bradley office or distributor.

For	Read This Document	Document Number
Programming Allen-Bradley motion controller with GML	GML Commander User Manual v4.01 GML Commander Reference Manual v4.01	GMLC-5.1 GMLC-5.2
Instructions for installation and set-up for the 1394 GMC system	1394 Digital, AC, Multi-Axis Motion Control System User Manual	1394-5.0
Instructions for installation and set-up for the S Class Compact motion controller	IMC S Class Compact Motion Controller Installation and Set-up Manual	999-122
An article on wire sizes and types for grounding electrical equipment	National Electrical Code	Published by the National Fire Protection Association of Boston, MA.
An article on wire sizes and types for grounding electrical equipment (European standards).	BS-EN 60204 Electrical Equipment of Machines	Published by British Standards Institute
A complete listing of current Allen-Bradley documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multi-languages	Allen-Bradley Publication Index	SD499
A glossary of industrial automation terms and abbreviations	Allen-Bradley Industrial Automation Glossary	AG-7.1

Terminology

Knowledge of the following terms are necessary to the understanding of the ALEC. For additional definitions refer to the *Allen-Bradley Industrial Automation Glossary*, (publication number AG-7.1).

AxisLink - is an IMC S Class option which links multiple motion controllers and ALECs to provide real-time axis coordination between their axes in distributed multi-axis system.

Virtual Axis - An axis on one motion controller, which is linked to an axis on another motion controller or ALEC via AxisLink.

Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- Words that you type or select appear in bold.
- When we refer you to another location, the section name appears in italics.
-

ATTENTION

The exclamation point inside of a triangle, followed by the word “ATTENTION” indicate circumstances that can lead to personal injury, death, property damage or economic loss.

-

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

ALEC Product Receiving and Storage Responsibility

You, the customer, are responsible for thoroughly inspecting the equipment before accepting the shipment from the freight company. Check the item(s) you receive against your purchase order. If any items are obviously damaged, it is your responsibility to refuse delivery until the freight agent has noted the damage on the freight bill. Should you discover any concealed damage during unpacking, you are responsible for notifying the freight agent. Leave the shipping container intact and request that the freight agent make a visual inspection of the equipment.

Leave the product in its shipping container prior to installation. If you are not going to use the equipment for a period of time, store it:

- in a clean, dry location
- within an ambient temperature range of 0 to 85° C (32 to 185° F)
- within a relative humidity range of 5% to 95%, non-condensing
- in an area where it cannot be exposed to a corrosive atmosphere
- in a non-construction area

Allen-Bradley Support

Allen-Bradley offers support services worldwide, with over 75 Sales/ Support Offices, 512 authorized Distributors and 260 authorized Systems Integrators located throughout the United States alone, plus Allen-Bradley representatives in every major country in the world.

Local Product Support

Contact your local Allen-Bradley representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

Technical Product Assistance

If you need to contact Allen-Bradley for technical assistance, please review the information in this manual first. Then call your local Allen-Bradley representative. For the quickest possible response, we recommend that you have the catalog numbers of your products available when you call. See the *Related Documentation* section of this chapter for the publication numbers of other manuals that can help with this product.

The Rockwell Automation Technical Support number is:

1-603-443-5419

On the Web

For information about Allen-Bradley, visit the following World Wide Web site:

http://www.ab.com/

Overview

ALEC Description

The ALEC is a single-axis AxisLink Encoder Converter which interfaces a single incremental encoder to Allen-Bradley IMC S Class motion controllers via AxisLink. As such, it provides a master encoder input for IMC S Class motion controllers or 1394 GMC systems without the need to sacrifice a full servo axis for use as a master encoder input. The ALEC also allows easy remote location of the master encoder for connection to an existing machine.

AxisLink is an IMC S Class option which links multiple motion controllers and ALECs to provide real-time axis coordination between their axes in distributed multi-axis systems. The ALEC encoder appears to the AxisLinked IMC S Class motion controllers as a virtual axis. This virtual axis can be used by the motion controllers as a master axis in electronic gearing, cam, lineshaft, and synchronization applications.

ALEC Features

The ALEC has the following features:

- Plug and Play - no software setup required.
- Single 18-36V DC power input with reverse voltage protection makes installation and hookup easy.
- Isolation of all external connections from the microprocessor logic for reliable performance.
- 4MHz maximum feedback count rate allows high speed operation without sacrificing resolution.
- Optically isolated high-speed position registration input for position synchronization and registration applications.
- Interfaces directly to Allen-Bradley 1394 GMC System and S Class Compact motion controllers.
- Normally Open status output.
- Bicolor LED status indication.
- Pre-engineered encoder cable assemblies available.
- A rugged steel case for greater protection. The case has pre-drilled mounting tabs.

The ALEC is based on an 80C31 microprocessor running at 16MHz. A CPU watchdog circuit with front panel LED indicator (CPU OK) is provided for fault indication and connection to a Normally Open Fault Relay.

The optically isolated encoder input accepts 5 Volt differential quadrature signals from standard incremental encoders. 5V and 12V DC are available from the ALEC for powering the encoder. An optically isolated registration input which latches encoder position is provided for direct interface to a position registration sensor. This input can be used directly with 5V or 24 V devices.

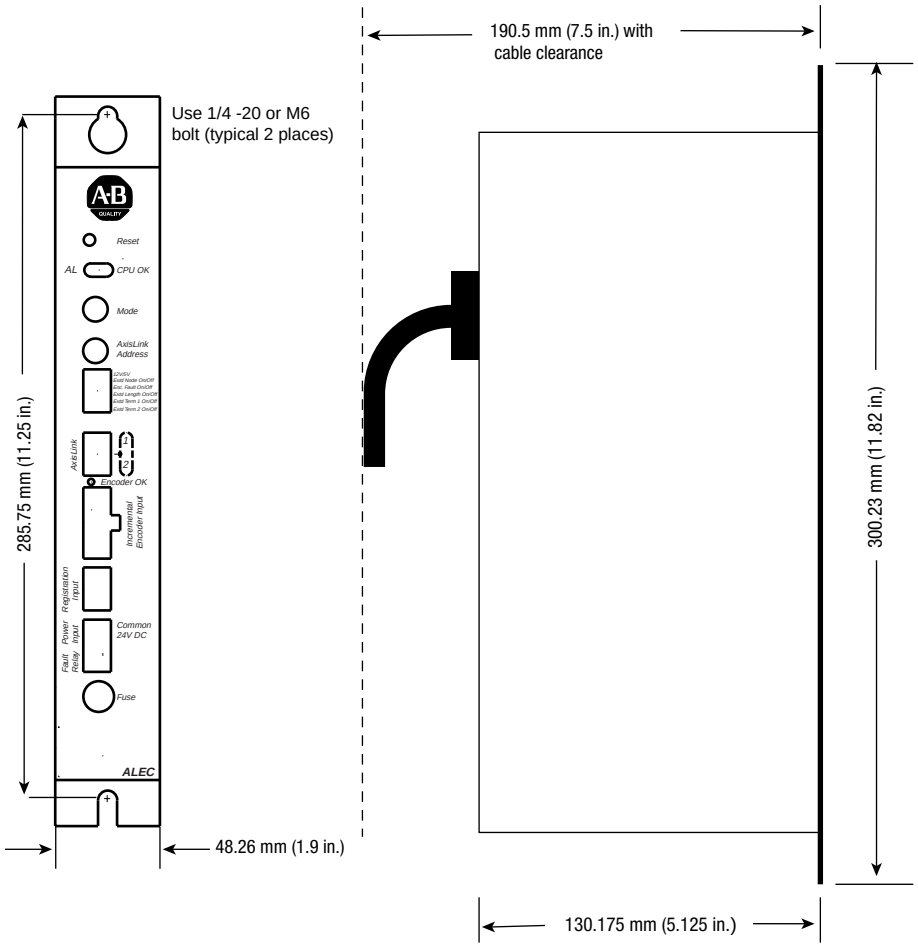
AxisLink communication with IMC S Class motion controllers is controlled by a dedicated communication chip. An address selector switch is provided on the front panel to set the address of the ALEC on AxisLink. A front panel AxisLink status LED (AL) is also provided.

The ALEC includes a switching power supply with fused 18-36V DC input which provides separate outputs for the optically-isolated encoder input and AxisLink communication channel.

ALEC Mechanical Specifications

Figure 1.1 shows the placement and labeling of major items on the ALEC front panel as well as the physical dimensions.

Figure 1.1 ALEC front panel



Package Specifications	
Package size mm and (in.)	300.23 x 130.175 x 48.26 (11.82 x 5.125 x 1.9)
Product weight kg and (lbs.)	1.68 (3.69)
Material	Painted Steel

Installation & Hook-Up

Chapter Objectives

Read this entire chapter before beginning to mount, connect, or wire any of the components to the ALEC. It is the responsibility of the installer to see that the installation conforms to the directions in this manual and local codes and procedures. This chapter covers the following topics.

- European Union Compliance.
- Mounting the ALEC.
- Connecting AxisLink.
- Connecting the Encoder.
- Allen-Bradley Encoders.
- Connecting a Registration Sensor.
- Using the Registration input.
- Wiring the power supply.
- Wiring a Normally Open Fault Relay.

Installing the ALEC

The ALEC is designed to mount in an electrical cabinet using the flanges on its back panel. This installation method should be observed for all applications. Before powering the ALEC, make sure it has been configured correctly and that the encoder and AxisLink cable are connected to it correctly.

ATTENTION

Do not attempt to make any electrical connections to the ALEC while power is applied. Doing so risks damage to the ALEC, external components, and your health.

Complying with European Union Directives

The information contained in this document pertains to the AxisLink Encoder Converter (ALEC), an Allen-Bradley product. If the ALEC is installed within the European Union or EEA regions and has the CE mark, the following regulations apply.

EMC Directive

The ALEC is tested to meet Council Directive 89/336 Electromagnetic Compatibility (EMC) in accordance with Article 10 (1). The following directives apply:

- EN 50081-2 EMC-Generic Emission Standard, Part 2-Industrial Environment.
- EN 50082-2 EMC-Generic Immunity Standard, Part 2-Industrial Environment.

The ALEC, as described in this document, is intended for use in an industrial environment and is not intended for use in a residential, commercial, or light industrial environment.

To meet CE requirements, the following are required:

- The ALEC must be mounted in an IP 54 rated metal enclosure on a metal panel.
- All equipment must be electrically bonded.
- You must use the specified Allen-Bradley cables.
- The ALEC is designed to function without maintenance when operated in the environment specified in this manual.
- Under normal conditions, the ALEC should not require any periodic maintenance. However, if conditions are less than ideal and any superficial dust has accumulated on the controller over time, remove the dust carefully. Also, it is recommended to periodically inspect all cables for abrasion and all connectors for proper seating.

Mounting the ALEC

Before mounting the ALEC, verify that the 1394 GMC System or the S Class Compact motion controller is installed correctly. Refer to the *1394 Digital AC Multi-Axis Motion Control System User Manual* (publication 1395-5.0) or the *IMC 23/x Installation and Set-up Manual* (publication 999-122) for installation instructions.

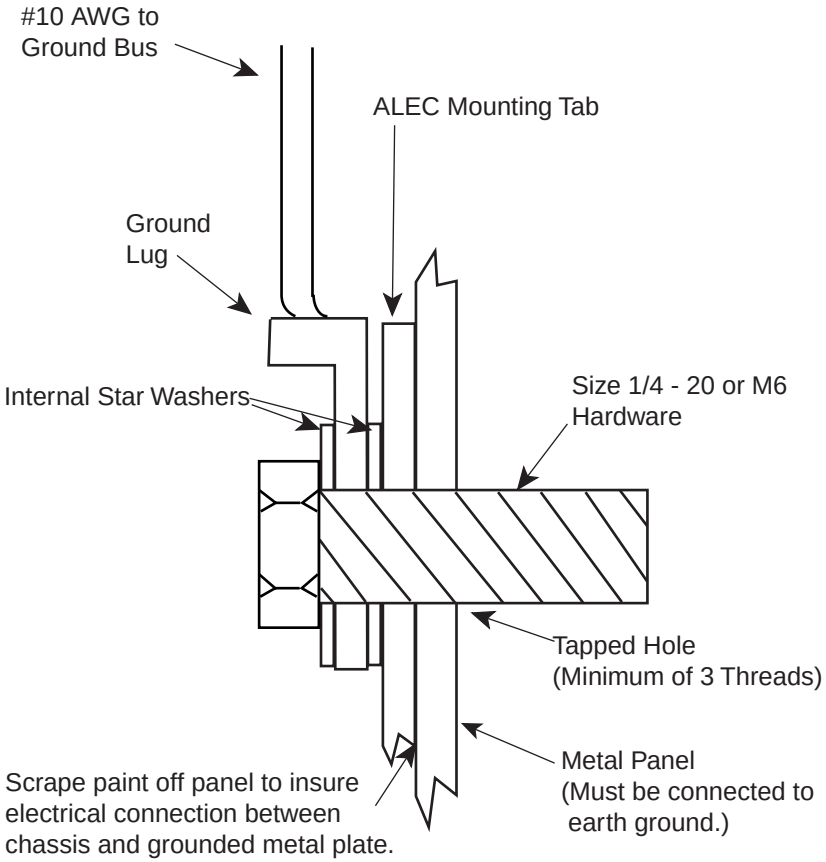
Mount the ALEC on a metal enclosure panel using two 1/4 -20 or M6 bolts. Refer to the Mechanical Specifications in the *Overview* chapter of this manual for mounting dimensions.

ATTENTION

To avoid a shock hazard, remove all power to the system panel before mounting the ALEC.

The mounting tabs should be bolted firmly to the metal enclosure. The following diagram shows the proper method of mounting to make sure the ALEC is grounded.

Figure 2.1 Proper Mounting and Grounding Method



Connecting the ALEC

Before attempting to use the ALEC, the Mode configuration, AxisLink Address, and DIP switches on the front panel must be set as required.

See the “Setup” Chapter in this manual for instructions on setting these switches.

The following section details how to wire the :

- AxisLink cable
- Incremental Encoder
- Registration Input
- Power connector
- Fault Relay

Wiring the ALEC

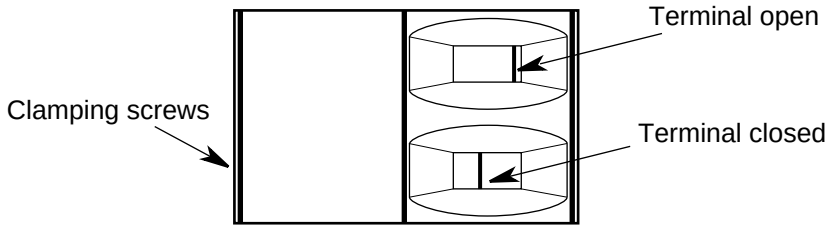
There are several connectors on the front of the ALEC. These connectors accept the cables from AxisLink (3 pin), the Encoder (12 pin), the Registration Sensor (3 pin), the power supply (top 2 pins of the 4 pin connector), and a Fault Relay (bottom 2 pins of the 4 pin connector). All but the Encoder connector use flying leads to attach to the connector. The following section details how to connect the flying leads to the screw terminals on the plugs.

Wiring Cable Flying Leads to the Plugs

To wire the cable leads to the plug:

1. Look at the plug to make sure the terminal is open. Figure 2.2 shows both an open and a closed terminal.

Figure 2.2 Terminal diagram



1.

Table 2.1 Terminal Steps

If the terminals are:	Do this:
Not open	Go to step 3
Open	Go to step 4

2. Using a small, flat-head screwdriver, turn the clamping screw counter-clockwise several times.

3. Using a proper stripping tool, strip the wire insulation back on the cable lead.

IMPORTANT All terminals accommodate a maximum of 14 gauge wire.

4. Trim the cable lead so that 0.275 inches of metal wire is exposed.

5. Insert the cable lead in the appropriate terminal. Refer to the proper figures for their locations.

6. Use the screwdriver to tighten the clamping screw to the proper torque (0.25 N-m/2.2 in-lb.).

7. Verify that the cable lead does not pull out of the terminal.

8.

Table 2.2 Cable Leads

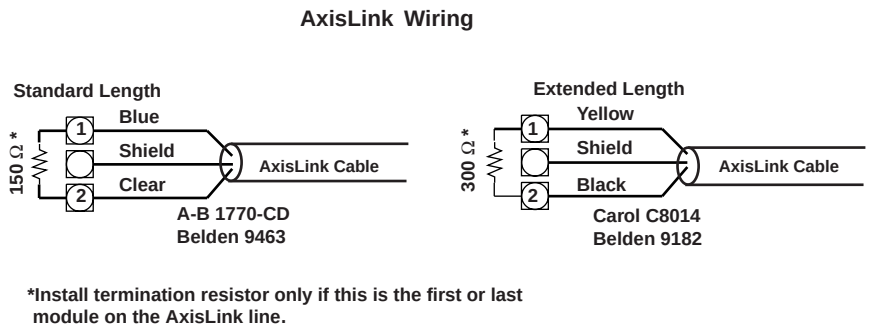
If the cable lead:	Do this:
Pulls out of the terminal	Repeat steps 3 through 9 again
Does not pull out of the terminal	Repeat steps 3 through 9 for the next terminal

The function of these connectors, their pinouts, and names are defined in the following sections.

Connecting AxisLink

Connect the AxisLink cable to the AxisLink terminal block on the front panel of the ALEC as illustrated in the following diagram.

Figure 2.3 Wiring the AxisLink Connector



*Install termination resistor only if this is the first or last module on the AxisLink line.

IMPORTANT Anchor the cable so that no more than 2 feet of cable is left unsupported. The excessive weight of an unanchored cable could pull the plug out of the connector.

When the ALEC is either the first module or the last module on the AxisLink cable, an external termination resistor must be installed. If you are using AxisLink in standard configuration, the resistor should be 150 Ohms. If you are using Extended AxisLink, the termination resistor should be 300 Ohms. These are in addition to the internal resistors set by DIP switches 5 and 6 on the ALEC front panel.

ATTENTION Install the termination resistor only if your ALEC is either the first or last module on the AxisLink line.

ATTENTION Even though AxisLink and RIO use the same cable, the connections are not interchangeable. Do not mix AxisLink and RIO connections. It causes both systems to not work properly.

Connecting the Encoder

Encoders are connected to the ALEC using a supplied cable assembly. Two encoder cable assemblies are available as shown in the following table.

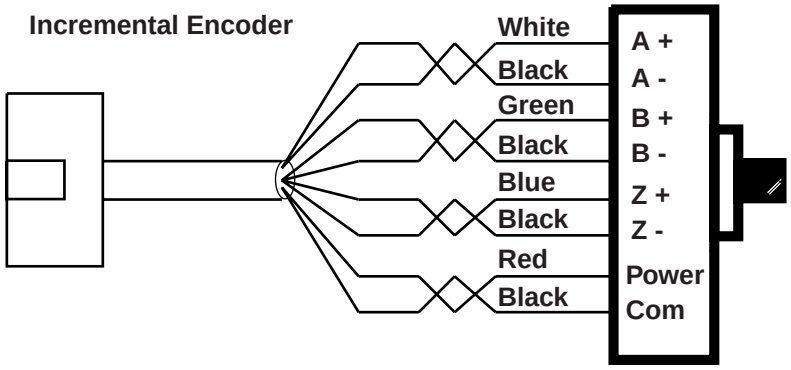
Table 2.3 ALEC Encoder Cable Assemblies

Order Number	Length
4100-CAE15	15 feet (4.5 meters)
4100-CAE30	30 feet (9 meters)

The encoder cable assemblies shown in the preceding table are electrically identical. The only difference is their length.

Connect the encoder to the ALEC encoder cable assembly as shown in the following diagram.

Figure 2.4 Wiring diagram for connecting the Encoder to the ALEC



Plug the other end of the encoder cable assembly into the Incremental Encoder Input connector on the front panel of the ALEC.

IMPORTANT Anchor the cable so that no more than 2 feet of cable is left unsupported. The excessive weight of an unanchored cable could pull the plug out of the connector.

The encoder power supply in the ALEC provides 5 or 12 volts DC for powering the encoder. Voltage selection is by DIP switch 1 on the front panel. Push the switch all the way to the left for 12V encoders or

all the way to the right for 5V encoders. See the "Setup" chapter in this manual for information on selecting the encoder voltage.

ATTENTION

The required mode must be selected before applying power to the ALEC. Improper voltage applied to the encoder can cause damage to the encoder, the ALEC, and to the operator.

Allen-Bradley 845F, 845H, and 845T Encoders

If you are using an Allen-Bradley 845F, 845H, or 845T incremental encoder, use the following table for your connections.

Table 2.4 ALEC Connections for AB 845F, 845H, and 845T Encoders

ALEC Signal	4100-CAExx Wire Color	Encoder Pin	Encoder Signal
A+ A-	White Black	A H	CH-A Output CH-/A Output
B+ B-	Green Black	B I	CH-B Output Ch-/B Output
Z+ Z-	Blue Black	C J	CH-Z Output CH-/Z Output
Power Common	Red Black	D F	B+ Input B+ Return

Allen-Bradley 845K Encoders

If you are using an Allen-Bradley 485K-SAxZx4-xxY3 incremental encoder, use the following table for your connections.

Table 2.5 ALEC Connections for AB 845K Encoders

ALEC Signal	4100-CAExx Wire Color	Encoder Wire Color	Encoder Signal
A+ A-	White Black	White Black	CH-A Output CH-/A Output
B+ B-	Green Black	Blue Black	CH-B Output Ch-/B Output
Z+ Z-	Blue Black	Green Black	CH-Z Output CH-/Z Output

Table 2.5 ALEC Connections for AB 845K Encoders

ALEC Signal	4100-CAExx Wire Color	Encoder Wire Color	Encoder Signal
Power Common	Red Black	Red Black	B+ Input B+ Return

Allen-Bradley 845P Encoders

If you are using an Allen-Bradley 845P-SHC14-xx3 incremental encoder, use the following table for your connections.

Table 2.6 ALEC Connections for AB 845P Encoders

ALEC Signal	4100-CAExx Wire Color	Encoder Wire Color	Encoder Signal
A+ A-	White Black	Red Violet	CH-A Output CH-/A Output
B+ B-	Green Black	Green Blue	CH-B Output Ch-/B Output
Z+ Z-	Blue Black	Yellow Orange	CH-Z Output CH-/Z Output
Power Common	Red Black	White Black	B+ Input B+ Return

ATTENTION

Do not attempt to make any electrical connections to the ALEC while power is applied. Doing so risks damage to the ALEC, peripheral equipment, and your health and safety.

ATTENTION

The ALEC does not support the removal or the insertion of any connectors when under power. The power disturbance can result in unintended machine motion, loss of process control, or an electrical arc that can cause an explosion in a hazardous environment.

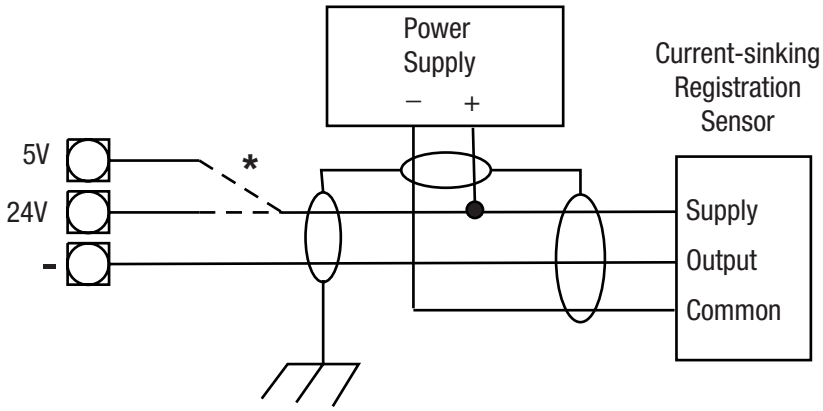
Connecting a Registration Sensor

The ALEC provides a high-speed optically isolated registration input. If required in your application, this input can be used to latch the position of the encoder when the registration sensor is activated. The registration input requires 2.5 mA at 5V DC or 24V DC to operate.

If you are using a current sinking proximity switch, registration sensor, or active-low encoder marker, connect it to the ALEC and an appropriate power supply as shown in the following diagram.

IMPORTANT Do not use the relatively noisy machine 24V power supply for the registration input. For best results, use a separate power supply just for the registration sensor.

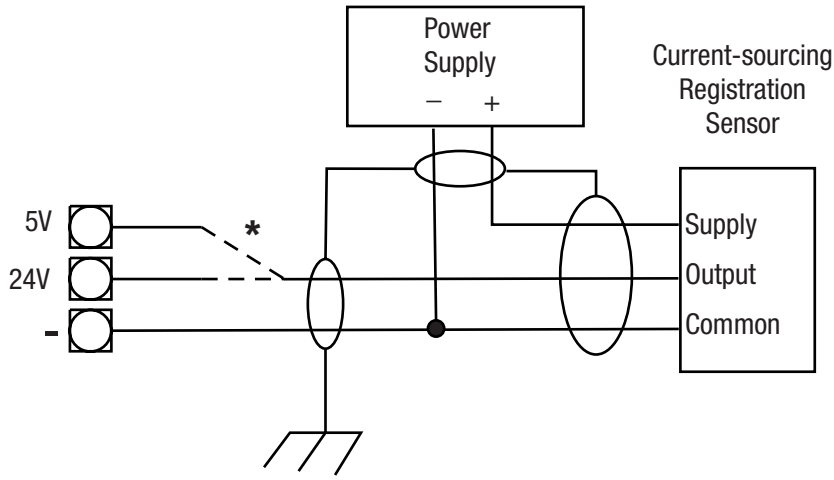
Figure 2.5 Current-sinking Registration Sensor



*Use 5V terminal and 5V power supply for 5V sensors.
Use 24V terminal and 24V power supply for 24V sensors.
Recommended cable is Belden 9501 or equivalent.

If you are using a current sourcing proximity switch, registration sensor, or active-low encoder marker, connect it to the ALEC and an appropriate power supply as in the following diagram.

Figure 2.6 Current-sourcing Registration Sensor



*Use 5V terminal and 5V power supply for 5V sensors.
Use 24V terminal and 24V power supply for 24V sensors.
Recommended cable is Belden 9501 or equivalent.

The connections shown in the figures are typical. Since input devices vary in their specific connection, please consult the wiring diagram for your registration device to determine the exact connections.

Using the Registration Input

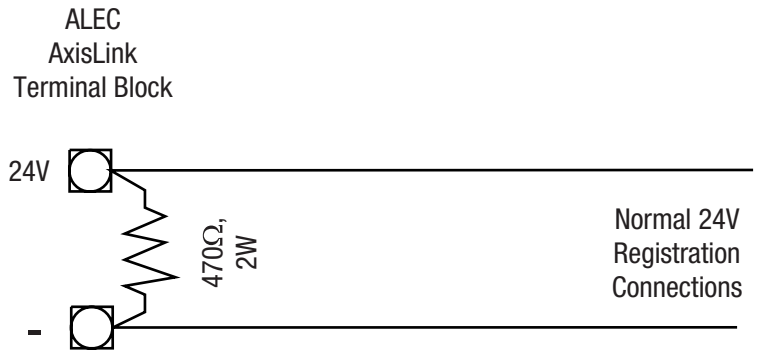
Since the registration input is used to latch axis position within 1 micro second, it employs a fast optocoupler and is not filtered for switch bounce. In applications which use a similarly fast registration sensor, this is not usually a problem. However, in some applications, the fast response and lack of filtering mean that extra precautions must be taken.

Since the registration input is – and has to be – sensitive because of its function, it is best to treat it not like a discrete input but as you would treat a sensitive analog input. The registration input is floating (not referenced to any common) and is thus similar to a differential servo amplifier or encoder input. As with a servo amplifier or encoder input, best results are obtained by using shielded twisted-pair cable for all registration wiring as shown previously.

The registration input current is 2.5mA when the input is activated. While this is a reasonable current for most 5V devices (the marker channel on an encoder for instance), it is low for typical 24V devices,

making them more susceptible to interference. For these devices, the ON current can be raised by a shunt resistor across the registration input, as shown in the following diagram.

Figure 2.7 ALEC Terminal Block



IMPORTANT Where high levels of repetitive noise is unavoidable, Normally Closed sensors can offer improved immunity.

This resistor increases the current drawn from the registration sensor to over 50mA. If your registration sensor can handle more ON current, you can use a lower resistance value, but be sure to check the power dissipation of the resistor.

In severe cases, it may also be necessary to use an isolated power supply only for the registration inputs. With 24V devices, do not use the relatively noisy machine or I/O power supply.

Power Supply Connector

The power supply connector is used to connect power to the ALEC. There is one power input connector for the ALEC. The input power is used to operate the ALEC and attached transducers.

The ALEC operates within the voltage range of 18-36V DC. The power source must be able to supply at least 12W of power continuously.

The pin layout and functionality for this connector are shown in the following table.

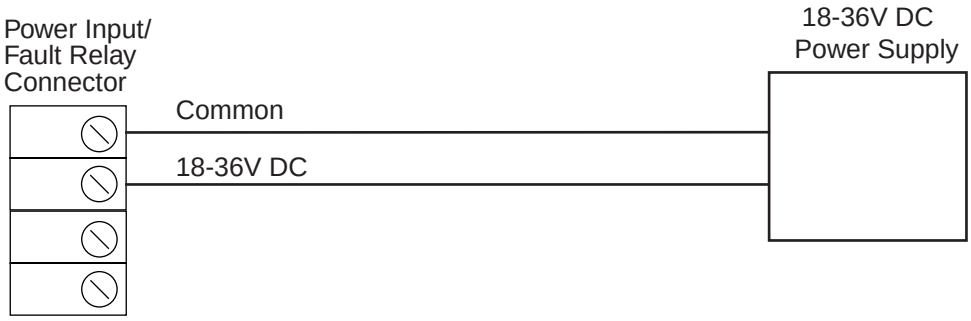
Table 2.7 Power Supply/Fault Relay Pin Functions

Power Supply	
Pin Position from Top	Pin Function
1	Common
2	Power (18-36V DC)
3	Fault N/O Relay Contact
4	Reference -

The following diagram illustrates the power connections for the ALEC.

IMPORTANT Power Common is internally connected to chassis.

Figure 2.8 Wiring diagram for connecting the power cable to the connector



IMPORTANT Anchor the cable so that no more than 2 feet of cable is left unsupported. The excessive weight of an unanchored cable could pull the plug out of the connector.

If you reverse the power supply connections, the power supply fuse (on the front panel) blows, protecting the ALEC from damage. Make

sure you correct the wiring before replacing the fuse with a 2A Slow Blow, 1/4 x 1 1/4 fuse of the same type for continued protection.

ATTENTION

Do not apply power to the ALEC until the Mode switch is set correctly and all other connections have been made.

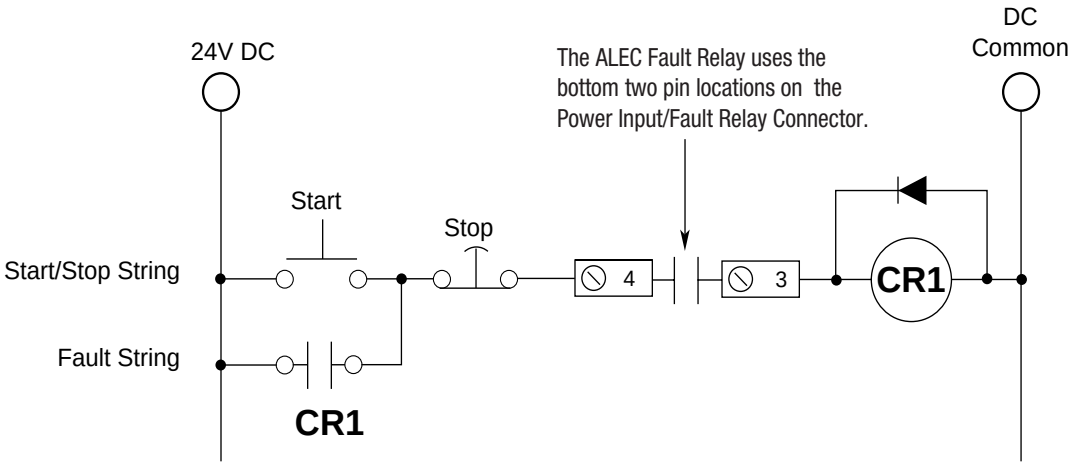
Fault Relay

To provide safe operation (opening the fault string if a fault occurs or power to the ALEC is lost) the fault relay outputs must be connected appropriately. The fault relay N/O contact is held energized when the ALEC has not detected a fault.

The Fault Relay provides one normally open status that is voltage free and isolated from the ground.

The following diagram is an example of a Normally open Fault relay. This is an example only it is neither a recommendation nor an endorsement. You know your application best and can best determine your own needs for a Fault Relay.

Figure 2.9 Example of a Normally Open Fault Relay



A typical fault detection scheme may require additional circuitry when used in applications where the ALEC fault contacts do not have sufficient capacity to drive a fault detection circuit directly.

Setup

Chapter Objectives

The ALEC is used in conjunction with the 1394 GMC System or the S Class Compact motion controller and an encoder. It is not a stand-alone product and must be configured to work with the hardware connected to it. This involves specific steps that are determined by the make and model of the hardware connected to the ALEC. This manual assumes that the GML Commander v4.01 or higher software is used.

This chapter covers :

- Setting the Mode rotary switch.
- Setting the AxisLink Address rotary switch.
- Setting the DIP Switches.
- Powering the ALEC.
- Configuring the ALEC with the GML Commander software.
- Compatible Allen-Bradley Encoder settings.

Setting the Rotary Switches

There are two rotary switches located on the front panel of the ALEC. These are used for setting the Mode (frequency) and AxisLink Address (node). You must set these switches before powering the ALEC.

Selecting the Operation Mode

The Mode selector switch on the front panel of the ALEC selects the axis position update rate; the periodic rate at which the ALEC can broadcast encoder position information onto the AxisLink communication network.

The mode switch is a 16-position rotary switch. Select an axis position update rate that is the same as the motion controller's servo rate. For example:

If your motion system servo rate is 500Hz , select position 4 on the mode switch with a small flat-head screw driver. At this setting, the ALEC updates position information 500 times per second.

ATTENTION The update rate for the ALEC must match the servo rate for the motion controller.

The following table lists the switch setting and its accompanying frequency.

IMPORTANT Switch positions 8 through F are reserved by Allen-Bradley for future use.

Table 3.1 ALEC Operating Modes

Mode	Servo Position Update Rate
0	250Hz
1	300Hz
2	350Hz
3	400Hz
4	500Hz
5	700Hz
6	850Hz
7	1000Hz
8-F	RESERVED

Selecting the AxisLink Address

The AxisLink Address rotary switch on the front panel of the ALEC selects the node number that is used by GML Commander. It is a 16 position rotary switch that identifies the address of the ALEC for the other devices on AxisLink. This number is entered at the Configure Virtual Axis dialog in GML Commander when AxisLink is selected. If you are setup for Standard AxisLink, you can only set the AxisLink Address switch to a number between 0 and 7. If you are setup for

Extended AxisLink then the ALEC can make use of any of the settings available on the AxisLink Address rotary switch.

IMPORTANT In Standard AxisLink only switch settings 0 through 7 are available for use.

Selecting the Options Configuration

Located on the front panel of the ALEC are 6 DIP switches for setting the operating options. These six DIP switches determine the way the ALEC operates. The DIP switches determine:

- supply voltage to the encoder
- sets extended or standard addressing nodes
- enables/disables the encoder loss fault relay
- sets extended or standard AxisLink cable length
- sets Termination 1 to extended or standard length
- sets Termination 2 to extended or standard length

Encoder Power (12V 5V)

The first DIP switch (1) sets the Encoder power to either 12V DC or 5V DC. Move the switch all the way to the left for 12 volts or all of the way to the right for 5 volts. This setting should match the voltage power requirement of the attached encoder.

ATTENTION DIP Switch 1 must be set to the voltage power (12V or 5V) requirement of the attached encoder.

Extended Nodes (Extd Node On/Off)

DIP Switch 2 sets the available nodes in AxisLink. If Extended Nodes is On (switch set to left), extended AxisLink is used with 16 node addresses available for use. If it is in the Off position (switch set to right), standard AxisLink is used and only 8 node addresses are available for use.

Encoder Fault (Enc. Fault On/Off)

This DIP switch (number 3) enables or disables the encoder fault. When the switch is in the On position (switch set to left), Encoder Fault is enabled. This means that when the ALEC detects a loss of encoder signal, the Encoder OK LED goes off, the CPU OK LED goes off, and the Fault Relay is opened. If the switch is in the Off position (switch set to the right), the Encoder fault is disabled. When a loss of encoder signal is detected, the Encoder OK LED goes off but the CPU OK LED and the Fault Relay are not affected.

Extended/Standard Length (Extd Length On/Off)

DIP Switch 4 determines whether the AxisLink cable that the ALEC is connected to can be 410 feet (125 meters) or only 82 feet (25 meters). AxisLink in standard length mode sets the maximum total length of the cable at 82 feet (25 meters). When AxisLink is in extended length mode the ALEC can be connected to an AxisLink cable with a total maximum length of 410 feet (125 meters). In either mode, the minimum cable length between any two modules must be at least one meter.

Extended/Standard Length Termination 1 (Extd Term1 On/Off)

DIP switch 5 sets Termination 1 internal resistor to either extended or standard mode. In the On position (switch is to the left) extended length termination is selected. In the Off position (switch is to the right) standard length termination is set.

Extended/Standard Length Termination 2 (Extd Term2 On/Off)

DIP switch 6 sets whether Termination 2 internal resistor to either extended length or standard length mode. In the On position (switch is to the left) extended length termination is selected. In the Off position (switch is to the right) standard length termination is set.

ATTENTION

DIP Switches 4, 5, and 6 must be set to the same position. They must all either be set to Extended or to Standard.

Extended versus Standard AxisLink

AxisLink has two modes of operation: Standard and Extended. In standard mode the maximum AxisLink cable length for the connected modules is limited to 85 feet (25 meters). In extended mode modules can be connected as needed on the AxisLink cable for up to 410 feet (125 meters). The number of modules that can be connected to AxisLink is limited to 8 in standard addressing mode where in extended addressing mode 16 modules may be connected.

Table 3.2 AxisLink Cable Length and Node Combinations

Extended/ Standard Length	Extended/ Standard Address	Maximum Cable Length	Maximum Number of Nodes
Standard	Standard	25 meters (82 feet)	8
Extended	Standard	125 meters (410 feet)	8
Extended	Extended	125 meter (410 feet)	8
Extended	Extended	100 meters (328 feet)(	12
Extended	Extended	75 meters (246 feet)	16

ATTENTION

The maximum values for both AxisLink cable length and the number of available Address nodes, with both Extended Length and Extended Node selected, were determined under controlled test conditions. These values may vary due to field conditions. Allen-Bradley cannot guarantee these optimal values under field conditions.

Allen-Bradley 845 Encoders

If you are using and Allen-Bradley 845 series incremental encoder, use the following table to determine the proper setting of the Mode Switch and DIP Switch 1.

Table 3.3 Alec Modes for Use with Allen-Bradley Encoders

For Allen-Bradley Encoder Model	Set Mode Switch to	Set DIP Switch 1 for Encoder Voltage
845F-SJxZ14-xxYx... 845F-SJxZ24-xxYx...	0 - 7 0 - 7	5V 12V
845H-SJxx14xxyx... 845H-SJxx24xxYx...	0 - 7 0 - 7	5V 12V
845K-SAxZ14-xxY3 845K-SAxZ24-xxY3	0 - 7 0 - 7	5V 12V
845P-SHC14-xx3	0 - 7	5V
845T-xx12Exx... 845T-xx13Exx... 845T-xx42Exx... 845T-xx43Exx...	0 - 7 0 - 7 0 - 7 0 - 7	5V 5V 12V 12V

ATTENTION

Select the proper Mode and DIP Switch settings before applying power to the ALEC to avoid encoder damage.

IMPORTANT

Encoders in a given family not shown in the above table are NOT compatible with the ALEC and should not be used.

The correct mode must be selected before applying power to the ALEC and before connecting the encoder, otherwise an improper voltage may be applied to the encoder, possibly causing damage. Remember, the ALEC only reads the mode switch at power up or after reset to determine the periodic update rate.

ATTENTION

Check the status of other devices connected to the same AxisLink cable before pressing the Reset button on the ALEC.

Powering the ALEC

After setting the Mode and AxisLink Address switches and making the necessary connection as described in the installation section of this manual, you can apply power to the ALEC. The CPU OK and AL LEDs should turn green after applying power to the ALEC. Green LEDs indicate that it is working properly.

If both LEDs do not turn green at powerup, remove power from the ALEC and check all of your connections and the power supply fuse. Re-apply power. If both LEDs still do not turn green after powerup, shut down the ALEC and remove all ALEC connectors except power. Apply power again. If both LEDs now turn green, reinstall the connections one at a time until the problem is found. If both LEDs still do not turn green, disconnect everything and return the ALEC to Allen-Bradley for repair.

The ALEC has over current protection provided by a fuse on the printed circuit board. The fuse is 1/4 inch by 1 and 1/4 inches, 2 Amperes. If the fuse blows, always determine and correct the reason it blew before installing the new fuse.

ATTENTION

Never replace the fuse with the unit under power. When replacing the fuse, make sure it is of the proper rating.

IMPORTANT

Before powering the ALEC, make sure that it has been properly installed and configured according to the instructions contained in this manual.

ALEC With GML Commander

The ALEC is used with a GML Commander configured for AxisLink or Extended AxisLink. Before Commander can download a diagram to the ALEC, the Mode rotary switch must be set to the same servo update rate as any motion controllers or other ALECs connected to the same AxisLink cable. The AxisLink Address rotary switch on the ALEC must be set, and the proper settings must be in place on the ALEC's DIP switches. (See the sections in this chapter that pertain to these switch settings.) The ALEC must be connected to the AxisLink cable. Once these are done, GML Commander must be configured for AxisLink and the address for the ALEC entered on the AxisLink page of the Configure Control Options screen. For more detail about the individual steps, see the *GML Commander Reference Manual* (publication number GMLC-5.2), the "Using AxisLink" chapter.

Adding the ALEC to your Commander AxisLink Configuration

To add the ALEC to AxisLink and enable it to receive instructions from a GML Commander diagram do the following:

1. Connect the ALEC to the AxisLink cable.
2. Set the Mode rotary switch to the servo update frequency that matches the other devices on the same cable.
3. Select the address for the ALEC on the AxisLink Address rotary switch. This node number must be entered on the AxisLink page of Configure Control Options.
4. Set the DIP switches for use with Extended or Standard AxisLink.
5. Power the ALEC.
6. In the GML Commander software, enable AxisLink at the Interfaces page of Configure Control Options screen. You can select Extended AxisLink at this time.
7. Select the AxisLink Tab to access the AxisLink page of Control Options. Select the address of the control device to receive the downloaded diagram.
8. Select the remote devices from which to receive information.
9. Select OK.

10. Download the diagram.

IMPORTANT AxisLink is not enabled until the diagram is downloaded.

Once AxisLink is enabled, the AL LED should be green. If the AL LED is red, reset the ALEC by pressing the Reset button on the front panel of the ALEC box. If the AL LED stays red after re-setting, check the cabling and termination to make sure all of the wiring is done properly. If it remains red, call Allen-Bradley Technical Support.

For more information on AxisLink and how to use it with the ALEC see the "Using AxisLink" chapter of the *GML Commander Reference Manual* (publication 4100-5.3).

Fault Indication & Control Status

Chapter Objectives

This chapter covers the ALEC operation status. There are three status LEDs on the front panel of the ALEC. These LEDs provide "at-a-glance" monitoring of the system. The three LEDs monitor different aspects of the ALEC/AxisLink system. The LEDs are labeled: AL, CPU OK, and Encoder OK. The following LEDs and status conditions are covered in this chapter.

- AL LED
- CPU OK
- Encoder LED
- Fault Conditions

AL LED

The AL LED indicates the current state of AxisLink.

Fault states are separated into three basic categories:

- AxisLink Fault
- AxisLink Failing
- No Fault

Faults can be attributed to:

- improper installation
- improper ALEC switch configuration
- faulty hardware (i.e. broken cable)
- improper application

It is the responsibility of the user to make sure that the application is safe. Understanding the capabilities of the ALEC can help you achieve this goal.

The ALEC provides bicolor LED fault indication. The color and pattern of these LEDs provide "at-a-glance" indication of the status of the ALEC.

Although the ALEC is equipped with a Reset button, it is not a recommended form of fault resolution. As the ALEC can be a component of a larger configuration, pressing the Reset button can

cause other control devices to work erratically which could cause machine damage or personal injury.

ATTENTION

Pressing the Reset Button on the ALEC can result in erratic behavior in other attached control devices. This can create a dangerous situation for both the machine and the operator.

AxisLink Fault

The ALEC indicates AxisLink faults by a RED AL LED. In a fault condition, there have been at least 256 link errors and AxisLink has shut down. If this condition occurs, the ALEC must be reset by pressing the Reset button on the front panel or cycling power. Before pressing the Reset button or cycling power make sure that all applications that may be affected are stopped.

AxisLink Failing

When the AL LED flashes Red and Green, AxisLink is in danger of going offline. This situation indicates that there have been at least 96 link errors and is in danger of shutting down. This is usually caused by an intermittent cabling problem, excessive noise, improper cable termination, or a failing AxisLink module. When this situation occurs, AxisLink is still working but it could fail at any time.

If the application program in a motion controller on AxisLink is not running, that motion controller attempts to re-establish the failing links. It is possible that the failing condition can be corrected by itself if the source of the problem is corrected in time. If the application program is running, the controller does not attempt to re-establish the failing links – this must be done by the fault handling routine in the program.

If the failing links do not correct themselves you may have to shut the application down. Care should be taken to end the session before it moves to a fault state and shuts down on its own. Bring your session to a safe stop and check the cabling, noise levels, and AxisLink module before continuing. Call Tech Support if you have problems determining the cause of the failing situation.

No Fault

A green AL LED indicates AxisLink is running properly. This is the normal condition after power up and while the link is working.

Table 4.1 AL LED Status Indicators

AL LED	Status	Condition
RED	AxisLink Fault	At least 256 link errors - AxisLink Shuts Down
FLASHING RED/ GREEN	AxisLink Failing	At least 96 link errors - AxisLink is in danger of faulting.
GREEN	System OK	Normal State

CPU OK

The CPU OK LED is provided on the front panel of the ALEC to visually monitor the state of the microprocessor. This LED should remain lit when under normal operation and goes out when the CPU enters a fault condition.

Encoder OK LED

The Encoder OK LED monitors the signal from the incremental encoder connected to the ALEC. When the encoder is working normally, the LED is lit. It goes out when the encoder signal is lost, signifying an Encoder fault. If DIP switch 3, Encoder Fault, is in the ON position, a loss of signal de-activates the Normally Open Fault Relay.

IMPORTANT The Encoder OK LED is not latched. This means that LED does not have to be released either mechanically or electrically before it restarts reporting the current state of the Encoder.

Specifications

Figure A.1 ALEC Front Panel

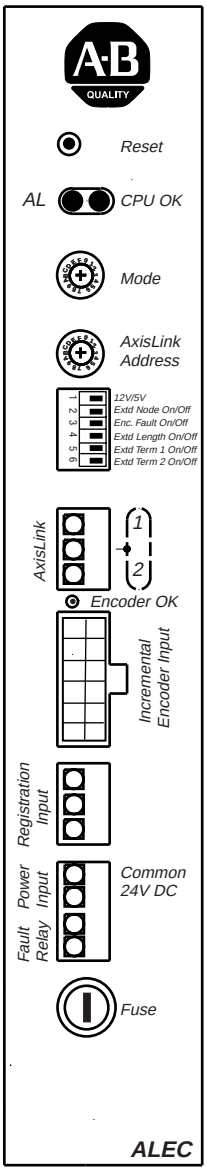


Figure A.1 shows the front panel layout showing the dip switches, pin locations, rotary switches, and LEDs for the ALEC. The following tables provide explanations for the rotary switches, dip switches, and pins.

Table A.1 Mode Rotary Switch Settings

Switch Setting	Description
0	250 Hz
1	300 Hz
2	350 Hz
3	400 Hz
4	500 Hz
5	700 Hz
6	850 Hz
7	1000 Hz
8–F	Reserved

Table A.2 DIP Switches

Switch Number	ON (Switch set to Left position)	OFF (Switch set to Right position)
1	12 Volt	5 Volt
2	Extended Node Addressing (16)	Standard Node Addressing (8)
3	Encoder Fault Enabled- Detects encoder fault and opens Fault Relay	Encoder Fault Disabled - Fault relay is not opened if Encoder faults.
4	Extended Length	Standard Length
5	Extended Length Termination 1	Standard Length Termination 1
6	Extended Length Termination 2	Standard Length Termination 2

ATTENTION

DIP Switches numbered 4, 5, and 6 must all be set to the same position.

Table A.3 AxisLink Connector

Pin location	Standard Length	Extended Length
Top	Blue	Black
Middle	Shield	Shield
Bottom	Clear	Yellow

Table A.4 Incremental Encoder Connector

Z-	**Z+**
B-	**B+**
A-	**A+**
Common	**Encoder Power**
Shield (Chassis)	**Reserved**
Reserved	**Reserved**

Table A.5 Mechanical Specifications

Specification	Description
Enclosure Type	Steel case with integral mounting tabs
Enclosure Size	300.23 x 130.175 x 48.26 mm (11.8 x 5.125 x 1.9 in)

Table A.6 Environmental Specification

Specification	Description
Operating Temperature	0 to 50 °C
Storage Temperature	-40 to 85 °C
Humidity	95% non condensing @ 50 °C

Table A.7 Electrical Specifications

Specifications	Descriptions
Power Input	18 - 36 Volts DC; 12 Watts maximum
Fuse	2A Slow Blow, 1/4 x 1 1/4
Protection	Reverse voltage via front panel fuse

Table A.8 Encoder Input Specifications

Specification	Description
Number of Encoder Inputs	1
Type of Encoder Input	Incremental AB quadrature; optically isolated, differential with marker channel (EIA RS422).
Encoder Interface IC	26LS33 or equivalent
Supported Encoder Devices	RS422 (5V DC) line driver outputs with or without marker
Supported Allen-Bradley Encoders:	845F-SJxZ14-xxYx... 845F-SJxZ24-xxYx... 845H-SJxX14-xxYx... 845H-SJxx24-xxYx... 845K-SAxZ14-xxY3 845K-SAxZ24-xxY3 845P-SHC14-xx3 845T-xx12Exx... 845T-xx13Exx... 845T-xx42Exx... 845T-xx43Exx...
Decode Mode	4X Quadrature
Maximum Encoder Frequency	4,000,000 counts per second (1MHz)

Table A.8 Encoder Input Specifications

Specification	Description
Encoder Minimum Voltage	+/- 3.0V differential (A - A\, B - B\)
Input Impedance	(see Encoder Input Equivalent Circuit diagram, figure A.6)
Encoder Power	5V DC or 12V DC +/- 4% at 0.5A maximum available from ALEC

Table A.9 Registration Input Specifications

Specification	Description
Number of Registration Inputs	1 (Axis0)
Input Type	Optically Isolated, floating
Operating Voltage	24V DC to 28V DC 5V DC to 10V DC
Input ON Current	2.5mA minimum
Input OFF Current	0.4mA maximum
Input Impedance	2kΩ (resistive) at 5V; 8.8kW (resistive) at 24V
Input Response Time	1μ second maximum

Table A.10 AxisLink Specifications

Specifications	Descriptions Standard Length	Descriptions Extended Length
Baud Rate	1 megabit per second	500 kilobit per second
Cable Type	AB 1770-CD RIO Belden 9463 or equivalent	Belden 9182 or equivalent
Cable Length	3 feet to 85 feet (1meter to 25 meters)	3 feet to 410 feet (1meter to 125 meters)

Table A.10 AxisLink Specifications

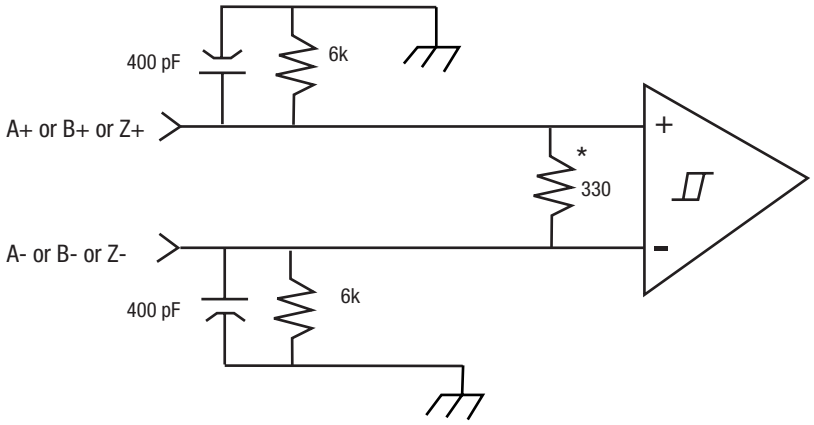
Specifications	Descriptions Standard Length	Descriptions Extended Length
Maximum Number of Nodes	8 with Standard Address; 16 with Extended Address	8 with Standard Address; see table in *Extended Versus Standard AxisLink* in the *Setup* chapter of this manual.
Addressing	User selectable address via rotary selector switch (use only 0-7)	User selectable address via rotary selector switch (use 0-F)
Number of Virtual Master Axes	1per ALEC; 4maximum total on Axislink	1per ALEC; 2 maximum total on Axislink
Type of Virtual Master Axis	Actual	Actual
Slave Axes	**Standard Addressing:** 28 maximum per ALEC virtual master axis (4 x 7 on motion controllers = 28) **Extended Addressing:** 60 maximum (4 x 15 = 60)	8 with Standard Address; see table in *Extended Versus Standard AxisLink* in the *Setup* chapter of this manual.
Number of Discrete I/O	0	0

Equivalent Circuit Diagrams

The following diagrams detail the equivalent circuits for the Encoder Input and the Registration Input.

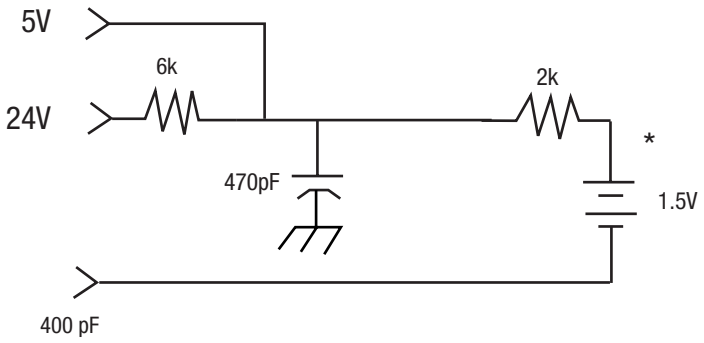
IMPORTANT The following diagrams are equivalent circuit models, NOT the actual circuits.

Figure A.2 Encoder Input Equivalent Circuit



* Includes encoder loss detection circuitry on A and B quadrature channels. This value is 10.5k for Marker (Z) Channel.

Figure A.3 Registration Input Equivalent Circuit



* Forward voltage drop of optocoupler diode

Upgrading From ALEC Series C to Series D

The ALEC Series D has undergone some changes that affect the mounting, wiring, and configuring of the ALEC when upgrading from an ALEC series C to an ALEC series D.

Summary of Changes

Physical Dimensions

The length and width of the box have seen no appreciable difference in size. The depth of the box has the greatest significance. The ALEC series C has a depth of 4.5inches (114 mm) and the ALEC series D has a depth of 5.125 inches (30.175 mm). However, the new design of the mounting tabs decreases the **difference** to .25 inches (6.35 mm). This should pose no problems for wiring the ALEC series D using existing cabling.

Mode Rotary Switch

The Mode rotary switch has changed from a 10 position switch to a 16 position switch. The positions 0-7 are still used for setting the frequency of the encoder position update. However the values are not the same as they were in the ALEC series C. The following table contains the Series C and the Series D frequency values.

Table B.1 Comparative Frequency Values

Switch Setting	ALEC Series C	ALEC Series D
0	1000 Hz	250 Hz
1	1000 Hz	300 Hz
2	700 Hz	350 Hz
3	700 Hz	400 Hz
4	500 Hz	500 Hz
5	500 Hz	700 Hz
6	350 Hz	850 Hz
7	350 Hz	1000 Hz
8	250 Hz	Reserved

Table B.1 Comparative Frequency Values

Switch Setting	ALEC Series C	ALEC Series D
9	250 Hz	Reserved
A-F	Not available	Reserved

The Mode switches in the Series D no longer control the encoder power output voltage. The Encoder Output voltage is now controlled by the position of DIP switch 1. (See the section on DIP switches in the *Setup* chapter of this manual.)

AxisLink Address Rotary Switch

The AxisLink Address rotary switch has been changed from a 10 position switch to a 16 position switch. The additional settings are for accommodating the increased addresses that become available when you are in Extended node AxisLink. Earlier version of the ALEC did not support the Extended Node AxisLink. The DIP switch 2 determines whether AxisLink is in Extended or Standard Node. When in Standard Node only rotary addresses 0-7 are available for use. When it is in Extended Node the settings 0-F are available for use.

DIP Switches

The ALEC series D has added a bank of DIP switches. These were not available in the series C. They change the way in which you configure the ALEC series D from the ALEC Series C. This is most notable for configuring the encoder properties and AxisLink.

Table B.2 DIP Switch Settings

Switch Number	ON Position (Left)	OFF Position (Right)
1	12V	5V
2	Extended Node	Standard Node
3	Encoder Loss Fault detection On	Encoder Loss Fault detection Off
4	Extended Length	Standard Length
5	Extended Length Termination 1	Standard Length Termination 1
6	Extended Length Termination 2	Standard Length Termination 2

Resetting the Encoder Mode

The following table shows the differences between series C and series D for setting the switches for the update frequency and the output voltage for the encoder.

Table B.3 Comparative Switch Settings

Update Rate Encoder Output	Setting for ALEC series C (Mode Switch)	Setting for ALEC series D (Mode Switch; DIP Switch Position)
250Hz 5V	8	0; DIP Switch 1 is Right
250Hz 12V	9	0; DIP Switch 1 is Left
350 Hz 5V	6	2; DIP Switch 1 is Right
350 Hz 12V	7	2; DIP Switch 1 is Left
500Hz 5V	4	4; DIP Switch 1 is Right
500Hz 12V	5	4; DIP Switch 1 is Left
700 Hz 5V	2	5; DIP Switch 1 is Right
700 Hz 12V	3	5; DIP Switch 1 is Left
1000 Hz 5V	0	7; DIP Switch 1 is Right
1000 Hz 12V	1	7; DIP Switch 1 is Left

Encoder OK LED

An Encoder OK LED has been added just below the AxisLink connector. This provides at-a-glance verification that the encoder signal is being received.

Fault Relay

The power connector has been enlarged to contain two more pins. The top two pins are used for connecting power and the bottom two pins are for connecting a fault relay.

For more detailed information about any of the changes made to the ALEC series D, review the material in this manual.

A

AL LED 37
ALEC With GML Commander 34
Allen-Bradley Support 5
AxisLink Address rotary switch 48
AxisLink Failing 38
AxisLink Fault 38

C

CE requirements 12
Commander
AxisLink Configuration 34
Comparative Frequency Values 47
Comparative Switch Settings 49
Configuration
GML Commander
Adding to a Commander Diagram, 34
Connecting a Registration Sensor 20
Connecting AxisLink 15
Connecting the ALEC 13
Connecting the Encoder 17
Contents of this Manual 3
CPU OK 39

D

Definitions
Description, 7
DIP Switch Settings 48
DIP Switches 48
Encoder Fault 30
Encoder Power 29
Extended Nodes 29
Extended/Standard Length 30
Extended/Standard Length Termination 1 30
Extended/Standard Length Termination 2 30
Options Configuration 29
DIP switches 29

E

Encoder Input Equivalent Circuit 46
Encoder OK LED 39
Encoders
Allen-Bradley 845K 18
Equivalent Circuit Diagrams 45
European Union Directives
EMC Directive 12
Extended versus Standard AxisLink 31

F

Faults
AxisLink no fault 39
Fault Relay 24
faults
AxisLink faulted 38
Features, 7
Fuse, 33

I

Installing the ALEC 11

M

Mode rotary switch 47
Mode Settings
Allen-Bradley 845 Encoders 31
Mounting the ALEC 12

N

No Fault 39

P

Pin Functions
Power Supply, 23
Power Connector 22
Powering the ALEC 33
Product Receiving and Storage 4

R

Registration Input 21
Registration Input Equivalent Circuit 46
Related Documentation 3
Resetting the Encoder Mode 49
Rotary Switches
AxisLink Address 28
Operation Mode 27
Setting, 27

S

Selecting the Operation Mode, 27
Specifications
AxisLink 44
AxisLink Connector 42
DIP switches 41
Electrical 43

Environmental 43
Incremental Encoder Connector 42
Mechanical 42
mechanical 8
Mechanical,
Mode Rotary Switch Settings 41
Package, 9
Registration Input 44
Specifications Encoder input 43
Summary of Changes
AxisLink Address Rotary Switch 48
Encoder OK LED 49
Fault Relay 50
Mode Rotary Switch 47
Physical Dimensions 47
Support
Allen-Bradley Support 5
Allen-Bradley, 5
Local Product Support 5
local product, 5
Technical Product Assistance 5
technical product assistance, 5
support
On the Web 5

W

Wiring
Cable Flying Leads, 14
World Wide Web site 5

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 4100-5.3 - June 1999
Supersedes Publication 4100-5.3 -July 1998

© 1999 Rockwell International Corporation. Printed in the U.S.A.